S. EBERHARDT.

PROPELLER.

APPLICATION FILED JAN. 12, 1912.

1,229,243. Patented June 12, 1917.

Fig. 1.

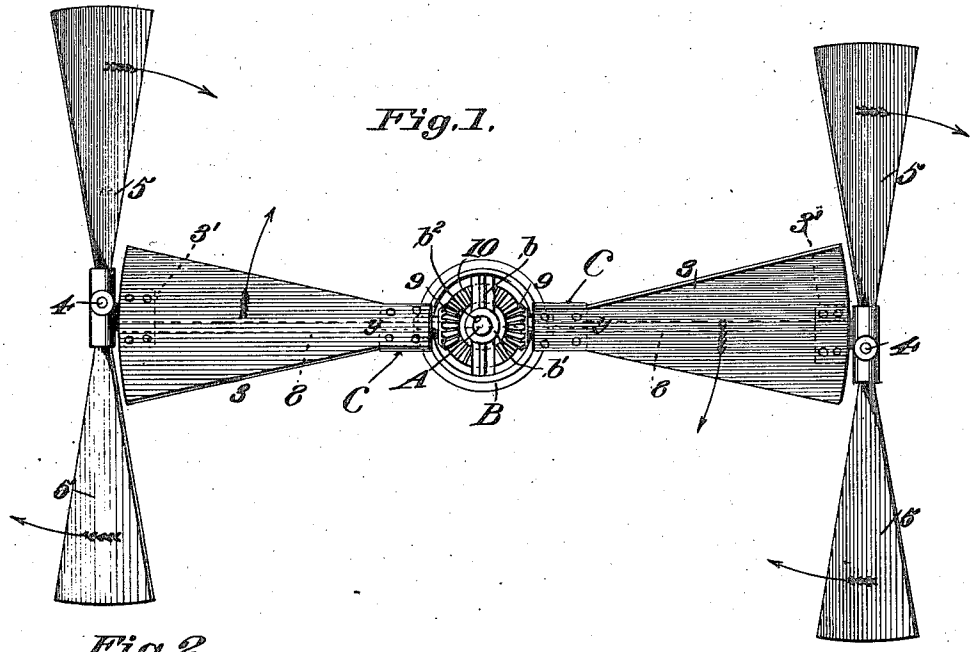


Fig. 2.

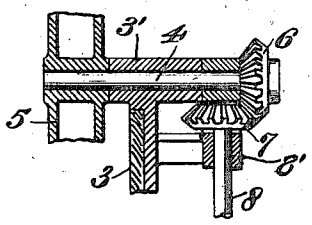


Fig. 4.

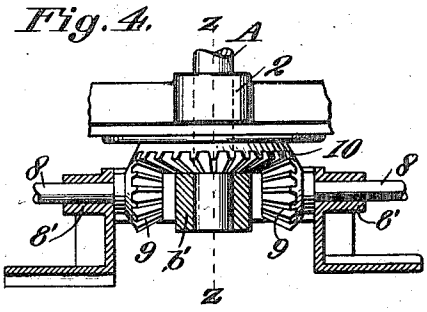


Fig. 3.

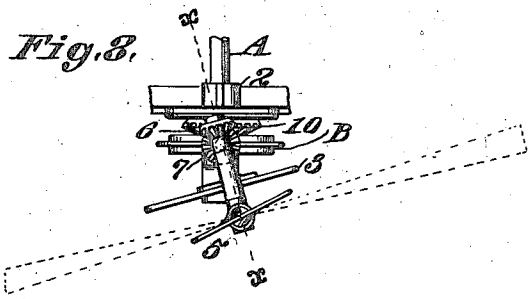
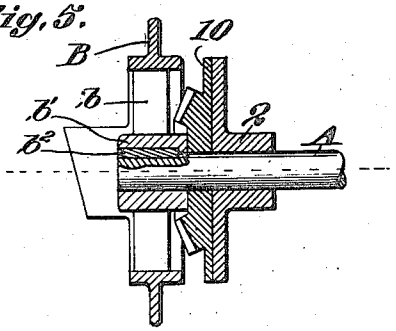


Fig. 5.



Witnesses:
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UNITED STATES PATENT OFFICE.

STEVEN EBERHARDT, OF MARTINEZ, CALIFORNIA.

PROPELLER.

1,229,243. Specification of Letters Patent. Patented June 12, 1917.

Application filed January 12, 1912. Serial No. 670,886.

To all whom it may concern:

Be it known that I, STEVEN EBERHARDT, of the United States, residing at Martinez, in the county of Contra Costa and State of California, have invented certain new and useful Improvements in Propellers, of which the following is a specification.

My invention relates to a propeller and particularly pertains to a propeller for use on aeroplanes, dirigible balloons, and the like.

It is the object of this invention to provide a propeller which is so designed and constructed that high speed of propeller rotation may be obtained from an engine driven at a comparatively slow speed; and in which the propeller blades are so rotated and arranged as to constantly act on new air, so as to obtain high propelling force and efficiency and thereby reduce slip to a minimum. Another object is to provide a propeller, which, when employed singly, largely obviates the side thrust commonly met with in the ordinary propellers now generally in use, and which is so constructed as to admit of a greater length of blade surface, than is practical in propellers now commonly employed, owing to the high peripheral speed of propeller blades of considerable length.

Further objects will hereinafter appear.

The invention consists of the parts and the construction and combination of parts as hereinafter more fully described and claimed, having reference to the accompanying drawings, in which:—

Figure 1 is a front elevation of the invention.

Fig. 2 is a detail section on the line X—X of Fig. 3.

Fig. 3 is a plan view of the device with the propellers in vertical position.

Fig. 4 is an enlarged horizontal section on the line Y—Y of Fig. 1 with some of the parts shown in elevation.

Fig. 5 is a vertical section on the line Z—Z of Fig. 4.

Referring to the drawings, A represents a main driving shaft rotatably mounted in a suitable bearing as 2. The shaft A is fixed to a frame comprising an annular ring B, transverse bar b and hub b' by a key b^2, so that said frame will rotate with the shaft. Any suitable number of radial plates or wings C extend from the ring B and propeller blades 3 of any suitable design are bolted or riveted thereto so as to rotate with the shaft and frame and these blades together with the driving mechanism therefor comprise a propeller blade device. The propeller blades at each end carry a suitable bearing 3′ in which is mounted a short rotatable shaft 4, which is offset a short distance beyond the outer end of the blade and is disposed at right angles to the faces of the adjacent blade.

Propeller blades 5 are keyed or otherwise rigidly mounted on the shafts 4 so as to rotate therewith and these blades 5 revolve in a plane parallel to the plane of the face of the blades 3.

On each shaft 4 is mounted at one end a bevel gear 6. These gears 6 mesh with bevel gears 7 carried by shafts 8 rotatably supported in suitable bearings 8′ on the blades 3. At the inner end, each shaft 8 carries a bevel gear 9. On the bearing 2 or other suitable support is non-rotatably attached a circular rack 10 having bevel teeth adapted to be engaged by the bevel gears 9.

In the operation of the device described, upon driving the shaft A, which may be rotated in either direction, by reason of the frame B and blades 3 being rigidly connected thereto and the bevel gears 9 whose shafts are supported on the blades and which gears engaging the fixed rack 10, will cause the blades 3 to rotate. Simultaneously, the shafts 8 driven by the engagement of the bevel gears 9 with the fixed rack 10, will cause the blades 5 to rotate in a plane parallel to the plane of travel of the blades 3, through the medium of the bevel gears 7 and 6 and the short shafts 4 to which the blades are fixed against independent rotation.

The gears 6 may be located on either side of the gears 7 to govern the direction of rotation of the blades 5 and the several gears may be of any desired size according to the rate of speed it is desired that the propellers should make.

From the foregoing, it will be seen that I have provided practically a triple propeller in which a pair of revolving propellers are used to travel in a plane parallel to the plane of travel of the central propeller at high speed owing to the gearing employed. By this arrangement, a large expanse of air is acted on by the propellers, which, being constantly carried into undisturbed areas of the air, have a high propelling force.

It is manifest that various forms of trans-

mission may be employed for operating the propellers 5 from the shaft A, and that other changes within the spirit and scope of the invention may be made.

Having thus described my invention, what I claim is:—

1. A propeller comprising a main shaft carrying main propeller blades extending at right angles thereto on opposite sides thereof, auxiliary propeller blades mounted on the outer ends of said main propeller blades and disposed at right angles to said main propeller blades, and means for rotating said auxiliary propeller blades operable by the rotation of said main propeller blades, substantially as set forth.

2. A rotary propeller mechanism comprising main propeller blades, auxiliary propeller blades attached to the outer ends of each of said main propeller blades and adapted to revolve therewith, and means for rotating said auxiliary propeller blades on their own axes during the revolution of the propeller, substantially as set forth.

3. A propeller mechanism comprising a main propeller and an auxiliary propeller rotatably mounted on the outer end of the main propeller blade with its axis at right angles to the plane of said main propeller blade, substantially as set forth.

4. A propeller mechanism comprising main propeller blades, auxiliary propeller blades rotatably mounted on the outer extremities of said main propeller blades to rotate in a plane therewith, and means for rotating said auxiliary propeller blades by the revolution of said main propeller blades, substantially as set forth.

5. In a propeller mechanism, the combination of a main driving shaft, a series of radially disposed propeller blades secured to rotate therewith, an auxiliary propeller blade journaled on the outer extremity of each of said main propeller blades to extend at right angles therewith, and shafts journaled on said main propeller blades and geared to the main shaft and to the axes of the auxiliary propeller blades, whereby the revolving of said main shaft and propeller will also operate said auxiliary propeller blades, substantially as set forth.

6. In propeller mechanism, a driving shaft, a support fixed to rotate with the shaft, a propeller blade device made in sections each secured on said support to rotate therewith, a propeller blade secured on each blade section, a relatively fixed rack, shafts rotatably supported on the blade sections each having a gear meshing with the rack, and means driven by said shaft to rotate the propellers, substantially as set forth.

7. In propeller mechanism, a driving shaft, a frame fixed thereto, a propeller blade device made in sections each fixed to said frame, a propeller blade secured on each blade section, a shaft rotatably supported on each of said blade sections, gears thereon engaging the rack, shafts on which the propeller blades are mounted, gears on said shafts and gears meshing with said gears on said shafts and carried by the shafts of the blade sections, substantially as set forth.

In witness whereof, I have hereunto set my hand and seal at San Francisco, California, this eighteenth day of December, A. D. nineteen hundred and eleven.

STEVEN EBERHARDT. [L. S.]

Witnesses:

MARCUS FREDRICK,

R. T. LEANER.